ABSTRACT OF THE DISCLOSURE

A vapor compression system includes a compressor, a gas cooler, an expansion device, and an evaporator. Refrigerant is circulated through the closed circuit cycle. Preferably, carbon dioxide is used as the refrigerant. Adaptive control is employed to optimize the coefficient of performance of the vapor compression system. As the system changes over time, a model that operates the system is modified. The model is determined by an adaptive control algorithm including variable coefficients. As the model changes, the variables of the adaptive control algorithm change. A control of the gas cooler is then adjusted to regulate the high pressure of the system, and therefore the coefficient of performance. In a first example, Least Mean Squares (LMS) is used to modify the variables of the adaptive control algorithm to optimize the coefficient of performance. In a second example, the coefficient of performance is optimized by a slowly varying periodic excitation method. A third example employs triangularization to find the optimal coefficient of performance.

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